## HUNGER THE PRIMITIVE DESIRE.

By S. V. Clevenger, M. D.

A paper on Researches into the Life History of the Monads by W. H. Dallinger, F. R. M. S., and J. Drysdale, M. D., was read before the Royal Micrscopical Society, Dec. 3d, 1873, wherein fission of the Monad was described as being preceded by the absorption of one form by another. One Monad would fix on the sarcode of another and the substance of the lesser or under one would pass into the upper one. In about two hours the merest trace of the lower one was left and in four hours fission and multiplication of the larger monad began. A full description of this interesting phenomenon may be found in the *Monthly Microscopical Journal* (London), for October, 1877.

Professor Leidy has asserted that the Amœba is a cannibal, whereupon Mr. J. Michels in the *American Journal of Microscopy*, July, 1877, calls attention to Dallinger and Drysdale's contribution and draws therefrom the inference that each cannibalistic act of the Amœba is a reproductive one, or copulative, if the term is admissible, The editor (Dr. Henry Lawson), of the English journal, Oct., 1877, agrees with Michels.

Among the numerous speculations upon the origin of the sexual appetite, such as Maudsley's altruistic conclusion, which always seemed to me to be far-fetched, I have encountered none that referred its derivation to *hunger*. At first glance such a suggestion seems ludicrous enough, but a little consideration will show that in thus fusing two desires we have still to get at the meaning and derivation of the primary one—desire for food.

The cannibalistic Amœba may, as Dallinger's Monad certainly does, impregnate itself by eating its own kind, and we have innumerable instances among Algæ and Protozoa of this sexual fusion appearing very much like ingestion. Crabs have been seen to confuse the two desires by actually eating portions of each other while copulating, and in a recent number of the *Scientific American*, a Texan details the *Mantis religiosa* female eating off the head of the male Mantis during conjugation. Some of the female Arachnidæ find it necessary to finish the marital repast by devouring the male, who tries to scamper away from his fate. The bitings and even the embrace of the higher animals appears to have reference to this derivation. It is a physiological fact that association often transfers an instinct in an apparently outrageous manner. With quadrupeds it is undoubtedly olfaction that is most closely related to sexual desire and its reflexes, but not so in man. Ferrier diligently searches the region of the temporal lobe near its connection with the olfactory nerve for the seat of sexuality, but with the diminished importance of the smelling sense in man the faculty of sight has grown to vicarate olfaction; certainly the "lust of the eyes" is greater than that of other special sense organs among Bimana.

In all animal life multiplication proceeds from growth, and until a certain stage of growth, puberty, is reached, reproduction does not occur. The complementary nature of growth and reproduction is observable in the large size attained by some animals after castration. Could we stop the division of an Amœba a comparable increase in size would be effected. The grotesqueness of these views is due to their novelty, not to their being unjustifiable.

While it would thus seem apparent that a primeval origin for both ingestive and sexual desire existed, and that each is a true hunger, the one being repressible and in higher animal life being subjected to more control than the other, the question then presents itself: What is hunger? It requires but little reflection to convince one of its potency in determining the destinies of nations and individuals, and what a stimulus it is in animated creation. It seems likely that it has its origin in the atomic affinities of inanimate nature, a view monistic enough to please Haeckel and Tyndall.

## NOTES ON THE ANATOMY OF THE ENCEPHALON, NOTABLY OF THE GREAT GANGLIA.

By Edward C. Spitzka, M. D.

The anatomy of no portion of the brain is so obscure and so imperfectly known as that of the so-called Thalamus opticus. One of the first requisites to a comprehension of its relations is the establishment of a proper nomenclature, and the point to start from is the very name under which the great ganglionic mass is known. Since it is not exclusively or even in the main connected with the optic tracts in any animal or man, and, indeed, is in the lower sauropsidæ and amphibians not connected with them at all, the affix *opticus* should be dropped, and the first word involving that very uncompromising conception of an elevation at the ventricular floor may be retained: *Thalamus*.

The current conception that the Thalamus is an elevation at the floor of the *lateral* ventricle is incorrect. One of our leading comparative anatomists will shortly review this question, and it will therefore be but necessary for me to refer to the matter.

In the cat's brain it can be clearly seen, that (aside from membranous separations) the great mass of the Thalamus is excluded from the cavity of the lateral ventricle by the fusion of the lateral edge of the fornix with the corpus striatum, or rather with the ependyma of that ganglion. Consequently, the two thalami are included in the third ventricle, which cavity on cross section resembles an upright T, whose vertical branch descends between the thalami, as a deep ditch, the *vulva cerebri* of the old anatomists.[1]

Luys, who was unfortunately wedded to certain physiological prejudices as to the function of the thalamic centres, restricted the term *Thalamus* to the most external mass. Meynert called all the centres in the aggregate by that term as a collective designation. He excluded, however, that gray mass which lines the sides of the vertical slit of the third ventricle.

Now, the third ventricle, as shown by Hadlich and Wilder, extends over the entire thalami; it would be, therefore, incorrect to limit the designation "central tubular gray of the third ventricle" to that portion only which lines the vertical slit. Either this latter designation should be extended to the entire thalamic masses or the term thalamus should be extended to the so-called central tubular gray.

Thus interpreted there would be, strictly speaking, but a single thalamus, consisting of two main masses, and a commissural part. The commissure is double. The thalami are primitively united by the lower of these commissures, which I propose to term "basilar commissure."[2] Secondarily, and only in animals above marsupials (as far as I am aware), do we find another commissure produced at an advanced period of embryonic development by apposition of the main masses. This is the so-called middle commissure of the brain, the *commissura grisea, c. mollis.* I should consider the least ambiguous designation, "the *thalamic fusion.*"

In a manner similar to that which separates the candate and lenticular nuclei from each other, and which divides the latter into subsidiary "articuli," the chief mass of each thalamus is separated into an inner and outer zone. The zones are separated from each other by

[1] The corresponding *penis cerebri* of the same anatomists has, by more fastidious colleagues, been rebaptized *pinus cerebri* and later *pineal gland*, now known as the *epiphysis cerebri.*

[2] Continuous in front with the *loci perforati antici*, behind with the infundibulum. Atrophic over the chiasm, it exhibits a set of transverse fibres and gray substance elsewhere.

a white intercalation, and especially the outer zone (also in part the inner) presents a beautiful alternation of gray and white laminæ.[3]

These two gray zones constitute the fundamental demarcation of the thalamus; they may be termed *zona grisea medialis* and *zona grisea lateralis*. In animals above the rank of marsupials we find added a round nodular mass, distinctly prominent at the ventricular floor, which lies anteriorly, while in still higher groups a second nodular prominence develops posteriorly. The latter is known as the posterior tubercle or pulvinarium, the former as the *anterior* or *superior tubercle*. The former designation seems the best to me, for although what I call the undifferentiated parent mass of the thalami is visible in sections anterior to those in which the anterior tubercle is reached, yet the latter, which I propose to term the *anterior nodule* of the thalamus, is the first differentiated centre reached. In man the *zona grisea medialis* is faintly seen before the anterior nodule is reached, but the anterior nodule reaches its main development before the zones do, and is absent where these are most prominent. In the carnivora generally, the anterior nodule projects far in advance of the zones. In these animals, too, a more complex arrangement of this nodule is found than in man, inasmuch as the anterior part of the internal slope of the thalamus shows several elevations absent in the human thalamus.

The *zona grisea medialis* appears pretty equally diffused and exhibits its lamination evenly both in front and in the middle of its course. The same applies to the human brain for the *zona grisea lateralis*. In the cat,[4] however, the anterior part of the external zone appears as a beautiful round compact ganglionic mass, protruding boldly into the internal capsule, and which acquires the characteristic lamination only in posterior planes.

It is interesting to note that the ganglionic matter of the thalamus is continuous with that of the ventricular nucleus of the corpus striatum (nucleus caudatus). Indirectly it is connected with the extra-ventricular nucleus, through that great common basilar gray mass, which is the *rendezvous*, as it were, of all the gray categories of the forebrain.[5]

In an earlier publication (Architecture and Mechanism of the Brain—Journal of Mental and Nervous Diseases, 1879), I have called attention to the fact that the ventricular nucleus of the corpus striatum is the representative of the primordial cerebral gray, inasmuch as the nerve cells of the embryonic and lower amphibian hemisphere are concentrated immediately subjacent to the ependyma of the latter ventricle. The majority of these cells are crowded away from the ventricular floor by the white substance developed in higher animals, and only a portion of the primitive gray remains subependymal. This is precisely what constitutes the corpus striatum. Now the corpus striatum actually *lines* the ventricle; it not only lies at its floor! Any section transversely to the cerebral axis and striking the forepart of the lateral ventricle in the Hippopotamus, Horse, Dog or Cat, will show that an attenuated part of the corpus striatum is continued around *over* the ventricle, and constitutes a greater part of its roof.

A similar comparative study shows that the nucleus lenticularis is also a subcortical development, that is, it results from the individualization of a gray mass originally continuous with the cortex, by means of an irruption of white masses. These at first separate fasciculi (as in the dog) in higher animals coalesce to constitute the external capsule. The segmentation of the lenticular nucleus into three distinct *articuli* so characteristic of the human brain, is not found in the carnivora; only the outer articulus is demarcated, and that but imperfectly.

In the carnivora the *laminae medullares* or white streaks of the lenticular nucleus are conspicuously absent in the anterior half of that ganglion; in its posterior half they appear and they rapidly increase in bulk as we proceed backwards, so that in planes where the human lenticular nucleus is still quite massive, we have in the dog only slight ganglionic masses intercalated between the fibre tracts. The *claustrum* is, in the carnivora, not the thin expanded lamina found in man, but a low and massive accumulation, hardly separated from the cortex of the Island of Reil. This fact strengthens Meynert's view that the claustrum is but an individualized cortical layer.

In conclusion I would mention as an isolated fact, and disconnected from the main subjects dealt with in these notes, that the anterior pyramids of the brain of the large Ceylon fruit bat (Pteropus fuliginosus) undergo a superficial decussation, as patent, and more so, as that of the optic chiasm. The pyramidal tract after decussating is continued as a distinct fasciculus on the lateral aspect of the medulla oblongata. In the same brain the fibres of the fornix can be clearly seen to terminate in the thalamus without descending to the base of the brain. Whether this applies to the whole of that tract, I am not able to say.

I would also note that in the brain of a large Ara (*Ara ararauna*) obtained from the Superintendent of the Central Park Zoological Gardens, Mr. W. A. Conklin, I found what appeared to be a thin commissure uniting the two cerebral hemispheres in their posterior half. This (commissure! if the observation was correct) was not, like the Corpus callosum, a connection between the internal white matter of both hemispheres, but merely a union of the superficial white, which in lower animals is well-developed outside of the cortical gray.

In the *carnivora the Ganglion* of Soemmering (the *Substantia nigra* in the human brain) is continuous with the innermost part of the lenticular nucleus. This fact strengthens Meynert's proposition, that the Ganglion of Soemmering, like the caudate and lenticular nuclei, should be considered as parts of one system, whose ganglia are connected with the fibres of the *pes pedunculi*.

In the elephant, whose brain, both in its mass, the preponderance of the hemispheres, and the concealment from view of the so-called "trapezium," takes a high rank as regards the grade of development, I had the opportunity to make and examine transverse microscopic sections from the Pons Varolii. The remarkable discovery was made that the descending (longitudinal) fibres of the Pons are wanting. Nothing but transverse fasciculi are seen in the field. Since the former fibres constitute part of the pyramidal tract, it follows that the tract of the voluntary impulses, the "will-tract," must take another course in the elephant, one which may be considered aberrant; for in all other placental animals so far examined by myself, the pyramidal tract runs through the Pons Varolii, as in man.

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ON WALDIVINE.—Waldivine, $C_{36}H_{24}O_{20}$, is a neutral principle, without rotatory power, very sparingly soluble in cold water, freely soluble in chloroform, insoluble in ether, and remarkable for the ease with which it is decomposed by alkalies.

CERTAIN OPTICAL AND VISUAL PHENOMENA—If the flame of a lamp is viewed through a narrow slit, the lustre of the flame and the effects of diffraction vary much according as the slit is vertical or horizontal, the light being much more considerable in the latter case.—M. TREVE.

[3] And yet the latest pretended description of these Ganglia, admitted, notwithstanding numberless glaring errors, into a journal of the standing of "Brain" (that by Dalton), has the Thalamus "homogenous."

[4] As seen in a series of transverse sections prepared by Dr. Graeme Hammond.

[5] Here meet the olfactory gray, the cortex, the *basis capitis nuclei caudati*, the *nucleus lenticularis*, the *claustrum*, the thalamic axial gray, etc., etc.